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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/345,270 06/30/99 PARK

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EXAMINER

MM91/0425

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ART UNIT

PAPER NUMBER

2871

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04/25/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/345,270

Applicant(s)

PARK ET AL.

Examiner

Quynh-Nhu H. Vu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) 21-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) ____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.

- 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

1. Applicant's election without traverse of Group I, claims 1-20 in Paper No. 5 is acknowledged.
2. Claims 21-31 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

Drawings

3. The Figure 4 is objected to because: "the second parts 46b are spaced with a selected distance L12" (specification on page 11, lines 2-3). However, the element "L12" of Fig. 4 is denoted the space between the branches 43b of the counter electrode 43. Correction is required.

Claim Objections

4. Claims 1 and 9 are objected to because of the following informalities: the phrase "the polarizing plate an the upper substrate" of claim 1, in lines 28-29 and of claim 9, in lines 29-30 should be changed to -- the polarizing plate and the upper substrate --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 9 are misdescriptive which respect to the specification and drawings. According to the specification and the drawing, a quarter wave plate is sandwiched between reflecting plate and lower substrate. However, the claims recited the quarter wave plate sandwiched between the quarter wave plate and the lower substrate. on

The remaining claims are also rejected since they depend on the indefinite claims.

In the below rejections, the claims are interpreted as the quarter wave plate sandwiched between the reflecting plate and the lower substrate.

6. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recited feature "the lengths of the first width and the second width are in the range of 2 to 8 μ m" is confusing. Does the applicant mean "a dimension of the first width and the second width are in the range of 2 to 8 μ m"? on

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [US 5,831,707] and Channin [US 4,385,805].

Regarding claims 1-3, Applicant's Prior Art disclose a reflective liquid crystal display comprising a lower substrate (11) and an upper substrate (12) opposed with selected distance (d); a liquid crystal layer (15) sandwiched between the lower substrate and upper substrate and comprising a plurality of liquid crystal molecules; a gate bus line and a data line formed on the lower substrate. It is inherent that any TFT film having a gate and bus line formed on the lower substrate. Furthermore, any TFT film provided adjacent to an intersection of the gate buss line and the data bus line and transmitting a signal of the data bus line into a pixel electrode when the gate bus line is selected. A counter electrode (14) and a pixel electrode (13) formed at an inner surface of the lower substrate, wherein both electrodes are formed with a selected distance and width so that most of the liquid crystal molecules in upper portions of those electrodes are sufficiently driven by forming a fringe field between said counter and pixel electrodes; a polarizing plate (18) disposed at an outer surface of the upper substrate; a reflecting plate (16) disposed at an outer surface of the lower substrate; and a quarter wave plate sandwich between the polarizing plate and the upper substrate. However, Applicant's Prior Art do not disclose that counter and pixel electrodes are made of

transparent conductor, and a distance between the upper and lower substrate is greater in length than a distance between the counter and pixel electrodes.

Ota et al. disclose (col. 14, lines 28-32) that pixel and counter electrode can be made of transparent conductive and ITO (indium tin oxide) is very good material for transparent conductive. Furthermore, Ota et al. disclose (Fig. 1) first alignment layer (120) having first rubbing axis and coated on an opposing face of the lower substrate (101); and second alignment layer (220) coated on an opposing face of the upper substrate (201) and having a second rubbing axis. It is inherent that in plane-field film, the alignment layer has a rubbing axis and has a surface for aligning the liquid crystal molecules in the absence of electric field.

Channin discloses (col. 3, lines 23-28) that the thickness of liquid crystal layer is about 12 to 50 micron and the spacing between two electrodes is about 25 micron.

Therefore, it would have been obvious to a person of ordinary skill in the art to made to a person having ordinary skill in the art to apply the distance between the upper and lower substrate is greater in length than a distance between the counter and pixel electrodes as Channin discloses (col. 4, lines 50-53) to increase the change in the direction of propagation of light rays passing through such a cell. And also, increasing the distance between 2 substrates is for reducing threshold voltage.

8. Claims 1-3 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [US 5,831,707] and Hiroshi [US 5,995,186].

Applicant's Prior Art and Ota et al., as applied in above rejection, disclose all claimed subject matter, except for the limitation that a distance between the upper and lower substrate is greater in length than a distance between the counter and pixel electrodes.

Hiroshi discloses that a distance between the upper and lower substrate is greater in length than a distance between the counter (49) and pixel (48) electrodes (col. 3, lines 22-25).

Therefore, it would have been obvious to a person of ordinary skill in the art to made to a person having ordinary skill in the art to apply the distance between the upper and lower substrate being greater in length than a distance between the counter and pixel electrodes, as taught by Hiroshi, for the benefit of achieving of the irregularities in the electric field (col. 4, lines 16-19).

9. Claims 4 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [US 5,831,707] and Channin [US 4,385,805] as applied to claims 1-3 above, and further in view of Kondo et al. [US 6,124,915].

Applicant's Prior Art and Channin, as applied in prior rejection, disclose all claimed subject matter except the first and second alignment layers are given with a pretilt angle of 0 ~ 10 degrees.

Kondo et al. disclose (col. 10, line 59 – col. 11, line 5) that the alignment layers are given with a pretilt angle below 4 degrees which is in the range of 0 ~ 10 degrees in

order to eliminate display irregularities due to variations in the manufacturing process. And also, it becomes possible to simplify the process and to decrease the cost.

Therefore, it would have been obvious to a person of ordinary skill in the art to made to a person having ordinary skill in the art to provide pretilt angle of $0 \sim 10$ degrees to eliminate display irregularities due to variations in the manufacturing process. And also, it becomes possible to simplify the process and to decrease the cost.

10. Claims 5-7 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [US 5,831,707] and Hiroshi [US 5,995,186].

Applicant's Prior Art and Ota et al, as applied in prior rejection, disclose all claimed subject matter. In addition, Ota et al. disclose that the liquid crystal molecules of positive dielectric anisotropy is used when the angle between the second rubbing axis and the electric field is 85 degrees (col. 7, lines 35-40). However, Applicant's Prior Art and Ota et al. do not disclose the limitations that rubbing axes of the first and second alignment layers are disposed anti-parallel each other; axis of the polarizing plate is coincided with the second rubbing axis.

Hiroshi disclose in Fig. 3 that a rubbing axis of the first alignment layer (Θ_{LC2}) and a rubbing axis of the second alignment layer (Θ_{LC1}) are disposed anti-parallel each other; wherein the polarizing axis of the polarizing plate (Θ_{PL2}) is coincided with the second rubbing axis (col. 3, lines 39-56).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ the rubbing axes of the first and second alignment layers are disposed anti-parallel each other; axis of the polarizing plate is coincided with the second rubbing axis, as taught by Hiroshi, for the benefits of improving picture quality, viewing wide angle, and fabricating at low cost. (col 4, ln 41)

11. Claims 8 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [PN 5,831,707] as applied to claim 1 above, and further in view of Kondo et al. [PN 6,124,915].

Applicant's Prior Art and Ota et al., as applied in prior rejection, disclose all claimed subject matter except the product of refractive anisotropy of the liquid crystal molecules and the distance between the upper and lower substrate is $0.2 \sim 0.6 \mu\text{m}$. And LC

Kondo et al. disclose that the product of refractive anisotropy of the liquid crystal molecules and the distance between the upper and lower substrate is $0.2 \sim 0.6 \mu\text{m}$ (col. 4, lines 19-28 or col. 9, lines 35-39).

Therefore, it would have been obvious to a person of ordinary skill in the art to made to a person having ordinary skill in the art to apply the refractive anisotropy about $0.2 \sim 0.6 \mu\text{m}$ to make dark state compatible with the increase level of transmission factor and lightness of the bright state as Kondo et al. describe on col. 9, lines 24-26.

12. Claims 9-10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [US 5,831,707] and Channin [US 4,385,805].

Applicant's Prior Art disclose in Figs. 1-2 a reflective LCD comprising a lower substrate (11) and an upper substrate (12) opposed with a first distance; a liquid crystal layer (15) sandwiched between the lower and upper substrates and comprising a plurality of liquid crystal molecules; a gate bus line and a data bus line formed on the lower substrate to define a pixel; a counter electrode (14) formed at each pixel of the lower substrate and having a plurality of branches diverged in parallel with the data bus line and at least a bar for connecting the branches, wherein the respective branches have a first width and they are spaced with a second distance; a pixel electrode (13) having a plurality of strips formed between the respective branches of the counter electrode, having a second width, and spaced apart by a third distance, and at least a bar for connecting the strips. (Although Applicant's Prior Art do not clearly show in Figs. 1-2 that the structure of counter and pixel electrodes having a plurality of branches diverged in parallel with the data bus. However, the applicant recited above of the structure of the counter and pixel electrode, which are basic structure in parallel of field.); a thin film transistor provided adjacent to an intersection of the gate bus line and the data bus line and transmitting a signal of the data bus line into the pixel electrode when the gate bus line is selected; a polarizing plate (18) disposed at an outer surface of the upper substrate; a reflecting plate (16) disposed at an outer surface of the lower

substrate; and a quarter wave plate sandwiched between the polarizing plate and the upper substrate.

Ota et al. disclose (col. 14, lines 28-32) that pixel and counter electrode can be made of transparent conductive and ITO (indium tin oxide) is very good material for transparent conductive. Furthermore, Ota et al. disclose (Fig. 1) first alignment layer (120) having first rubbing axis and coated on an opposing face of the lower substrate (101); and second alignment layer (220) coated on an opposing face of the upper substrate (201) and having a second rubbing axis. It is inherent that in plane-field film, the alignment layer having rubbing axis and having a surface for aligning the liquid crystal molecules in absence of electric field.

Channin discloses (col. 3, lines 23-28) that the thickness of liquid crystal layer is about 12 to 50 micron and the spacing between two electrodes is about 25 micron.

Therefore, it would have been obvious to a person of ordinary skill in the art to made to a person having ordinary skill in the art to apply the distance between the upper and lower substrate is greater in length than a distance between the counter and pixel electrodes as Channin discloses (col. 4, lines 50-53) to increase the change in the direction of propagation of light rays passing through such a cell. And also, increasing the distance between 2 substrates is for reducing threshold voltage.

13. Claims 9-10 and 15 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [US 5,831,707] and Hiroshi [US 5,995,186].

Applicant's Prior Art and Ota et al., as applied in above rejection, disclose all claimed subject matter, except for the limitation that a distance between the upper and lower substrate is greater in length than a distance between the counter and pixel electrodes.

Hiroshi discloses that a distance between the upper and lower substrate is greater in length than a distance between branch of the counter (49) and strip of the pixel (48) electrodes (col. 3, lines 22-25).

Therefore, it would have been obvious to a person of ordinary skill in the art to made to a person having ordinary skill in the art to apply the distance between the upper and lower substrate being greater in length than a distance between the branch of the counter and the strip of the pixel electrodes, as taught by Hiroshi, for the benefit of achieving of the irregularities in the electric field (col. 4, lines 16-19).

14. Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Prior Art in view of Ota et al. [US 5,831,707] and Hiroshi [US 5,995,186] as applied to claim 9 above, and further in view of Lee et al. [US 5,886,762].

Applicant's Prior Art, Ota et al. and Hiroshi, as applied in above rejection, disclose all claimed subject matter, except for the limitations that the pixel width (second width) is smaller in length than the spaced between the two counter electrode (second distance); and the counter width (first width) is smaller in length than the spaced between the two pixel electrode (third distance); wherein the distance between the

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branch of the counter electrode and the strip of the pixel electrode is in the range of $0.1 \sim 5 \mu\text{m}$.; wherein the ratio of the second width to the first width is $0.2 \sim 5$.

Regarding claim 14, Lee et al. disclose the pixel width and counter width about 4 to $8 \mu\text{m}$ (col. 3, lines 34-45).

Regarding claim 13, Lee et al. disclose that $[\text{Width of pixel electrode (second width)}] / [\text{width of counter electrode (first width)}] = 0.1 \text{ to } 10 \mu\text{m}$ (col. 3, lines 34-36).

This equation called equation 1.

Regarding claim 12, Lee et al. disclose that $[\text{Width of pixel electrode (second width) or width of counter electrode (first width)}] / [\text{distance neighboring of pixel electrode and counter electrode}] = 0.1 \text{ to } 2$ (col. 3, lines 38-41);

Or

$\text{Distance neighboring of pixel electrode and counter electrode} = [\text{width of pixel electrode (second width) or width of counter electrode (first width)}] / [0.1 \text{ to } 2] = [4 \text{ to } 8 \mu\text{m}] / [0.1 \text{ to } 2] = 2 \text{ to } 80 \mu\text{m}$. ***This equation called equation 2.***

According to Fig. 4, Lee et al. disclose that the second distance (distance between two adjacent counter electrode 62 and 63) $= 2 * [\text{Distance neighboring of pixel electrode and counter electrode}] + \text{width of pixel electrode}$. ***This equation called equation 3.***

According to Fig. 4, Lee et al. disclose that the third distance (distance between two adjacent pixel electrode 71 and 72) $= 2 * [\text{Distance neighboring of pixel electrode and counter electrode}] + \text{width of counter electrode}$. ***This equation called equation 4.***

Regarding claim 11, from equations 3 and 4, Lee et al. disclose that the second width (pixel width) is smaller in length than the second distance, and the first width (counter width) is smaller in length than the third distance; wherein the first and second width (counter and pixel width) is about 4 to 8 μm .

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ the width of pixel and counter electrode and the distance between the counter electrode and the pixel electrode, as taught by Lee et al, for the benefit of increasing transmittance and aperture ratio of the liquid crystal device.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kim et al. [US 6,111,627] disclose the width of pixel and counter electrode and the distance between the pixel and counter electrode.

Lee et al. [US 5,969,782] disclose the width of the pixel and counter electrode.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quynh-Nhu H. Vu whose telephone number is 703-305-0850. The examiner can normally be reached on 7:30-5:00 (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Sikes can be reached on 703-308-4842. The fax phone numbers

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for the organization where this application or proceeding is assigned are 703-308-7724 for regular communications and 703-308-7721 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

QNV
April 23, 2001



William L. Sikes
Supervisory Patent Examiner
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